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SOLAR ENERGY AS THE FUTURE OF SUSTAINABLE DEVELOPMENT

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Economic Development Office
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1 Robert C. Frasure Street, Sarajevo, 71000, BiH

Implemented by:
Partner microcredit foundation
15 maj bb, 75 000 Tuzla
Phone/Fax: +387 35 300 250/269

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ACRONYMS

BiH	Bosnia and Herzegovina
FBiH	Federation of Bosnia and Herzegovina
EU	European Union
RES	Renewable Energy Sources
MCF	Microcredit foundation
SME	Small and Medium Enterprisers

I. EXECUTIVE SUMMARY

USAID project Solar Energy as the Future of Sustainable Development (USAID Solar Energy project) has completely achieved the set results by increasing the local production of solar collectors for 20 operational small and medium enterprises (SMEs). Also the result in creating the market for use of solar energy is achieved through 124 installed systems in BiH.

Partner MCF has identified a gap in the market, especially taking into consideration the fact that European leaders signed up in March 2007 to a binding EU-wide target to source 20 % of their energy needs from renewables, including biomass, hydro, wind and solar power, by 2020. To meet this objective, Partner MCF aimed at increasing the local production of solar collectors and ultimately to increase the usage of solar collectors and/or other alternative sources of energy, through raising awareness on importance of using alternative energy sources.

USAID Solar Energy started in July 2011, with the total project value of app. 1,250,000 USD. In addition to USAID funds, 18, 4% of the funds came from Partner Microcredit Foundation. The project was aimed to support the alternative energy sources by developing domestic production of solar collectors in SMEs and by raising public awareness about the benefits of solar energy. The goal of project was to develop the value chain between producers and users of solar collectors.

The project focused on two selected groups: producers (20 SME) and end-users (households and SME) of solar collectors. In addition, the project conducted targeted activities related to marketing campaign in order to raise public awareness about the benefits of usage of solar collectors.

The project was conducted in two phases. Phase I included a specific set of activities focusing on market research. Phase II implies implementation program based on information gathered through the preparation activities and Partner's assumptions but was also opened for revision and renegotiation upon the findings/deliverables presented in Phase I.

One of the core activities of Phase II was to select local SMEs and develop their capacities for sustainable production of solar collectors. It was focused on small producers with existing production lines that can be easily switched, with non-expensive interventions to produce solar panels.

The support to producers consisted of:

- Financial support, half grant and half loan, sufficient for business startup,
- Practical business training,
- Technical training,
- Study visit,
- Continuous technical assistance for those producers who manage to successfully start up the production,
- Finding placement for produced solar collectors

It is important to note that project aimed at constantly raising awareness on importance of using alternative energy sources, to increase local production of solar collectors and ultimately to increase the usage of solar collectors for water heating and central heating systems.

II. INTRODUCTION: THE PROJECT AND ITS TASKS

1. PROJECT OVERVIEW

Taking into consideration the starting point with virtually no solar collector producers, negligible number of solar collectors in use in Bosnia and Herzegovina and generally very low level of awareness in public on renewable sources of energy, this project represented a pioneering step in order to raise awareness of general public. It was crucial for the success of this, but also for all future projects in the same regard. Their success is motivating and serves as a model for other potential producers.

In order to clearly identify the demand side for solar collectors, Partner MCF hired a specialized external agency to conduct market research. Market research was addressed to specific target groups of users, to determine whether there is a sufficient demand by potential users for solar collectors and whether there is enough interest among SMEs in target market sectors to meet the supply side and start up the production. Market research helped Partner MCF to overcome uncertainties related to the program implementation.

The project was based on a market research on the national level that had identified potential beneficiaries, their needs and potential, both for potential end-users and producers of solar collectors.

Therefore, market research included two different categories of the project beneficiaries:

1. SMEs as producers of solar collectors, and
2. Users (buyers) of solar collectors.

The user's category was consisted of:

- a) Households as users of solar collectors, and
- b) SMEs as users of solar collectors.

The two categories were treated separately. Market research was conducted for the entire BiH. The initial survey for SMEs as producers of solar collectors was also designed in such way which provided a number of producers and the conditions under which they are conducting business (whether they are producing or simply installing fabricated solar collectors).

The other part of the study focused on buyers of solar collectors for individual use was divided in two segments:

- Households who would install solar collectors on their family houses and use it for water heating systems,
- Small companies in high demand for hot water such are: small size accommodation facilities, restaurants, hair-dressers etc.

The study also measured the interest and the potential for usage of solar collectors as well as interest for other services/alternative energy products. This means that market research helped us to:

- Assess the demand in the market for production of solar collectors,
- Assess the demand for the target market niche for SME customers/potential buyers of solar collectors.

Based on the findings of the market research from the Phase I, the implementation of the Phase II was determined.

Market research provided information and recommendations on how to implement Phase II, how to organize activities and how to approach program beneficiaries in both target groups. These recommendations included wider implementation of the project that loans should be disbursed more broadly within the alternative technologies/energy sector, such technologies was considered as amendment to proposed Phase II project implementation program.

The main activity of Phase II was facilitating solar collector production through education and technical assistance to producers. The result of the core activity was increased use of renewable sources of energy. The core activity of Phase II, production of solar collectors, was endorsed with promotional activities, loan disbursement, monitoring and evaluation of production of solar collectors etc.

The main project steps were as follows:

1. Raising awareness activities (continuous activity)
2. Selection of SMEs that will get loan + grant to start up solar collector production
3. Selection of subcontractors for different areas:
 - Business training
 - Technical training
4. Loan disbursement to SMEs
5. Education for selected SMEs (business and technical training)
6. Production of solar collectors
7. Continuous technical assistance to solar collector producers
8. Finding buyers for produced solar collectors
9. Loan disbursement to solar collector users
10. Continuous monitoring & reporting

2. PROJECT ACTIVITIES AND RESULTS

The project started with a comprehensive market research which showed potential for both production and use of solar energy in BiH. The research consisted of: business environmental analysis in terms of use of alternative energy sources, analysis of current market supply and demand, in terms of using, manufacturing and installation of solar collectors or other alternative technologies, and identification of the markets potential.

When the potential was documented the actual core project activities started on January 11, 2012 with the estimated completion date of July 10, 2016.

The core project stage aims at:

1. Increase in the local production of solar panels for 20 local producers
2. Increase in use of solar systems for SMEs and households

In 2012, Partner MCF developed new loan products for solar collectors. The loan product is developed for the entrepreneurs, producers of solar collectors, and for clients, users of solar collectors. This loan product is created to be competitive on the microfinance market. For the solar collector buyers, Partner offered loan with consultancy by producers of solar collectors and various educational materials.

In February 2013, Partner MCF started with disbursement of loans to households and small business. The final goal was to disburse more than 100 loans during the project period.

During project implementation USAID Solar Energy project disbursed 124 loans for solar collectors), in total amount of 525,877.63 USD which resulted with 124 installation of solar systems in BiH.

2.1. Increase in the local production of solar panels for 20 local producers

The increase in the local production was achieved through enabling 20 local SMEs in developing capacities for sustainable production of solar collectors. It is focused on small producers with existing production lines that can be easily switched, with non-expensive interventions to produce solar panels. For producers the project represented a whole package enabling them to start up the solar panel production: loan, grant (in the same size as the loan is) and technical assistance during the project period. Grant assets awarded to 20 producers were in the individual

amount of app. USD 5,700 and the loan in the same amount of app. USD 5,700. The stated goal was achieved by provision of practical technical and business training covering the areas of: solar collectors production, business planning, accounting, financial education, marketing (market research, promotion) etc.

After the project beneficiaries successfully completed the technical training, each of the 20 companies produced a single solar collector. The produced solar collectors were gathered, installed as a system and donated to the City Stadium in Tuzla.

2.1.1. Business training

Considering that the sustainability of solar collector production businesses is crucial for the project success, Partner planned all solar producers to attend the same business training in order to improve their business skills. For the purpose of the business training, Partner MCF hired a subcontracting educational company that conducted 5 days business training for 20 selected solar collectors 'producers. In order to limit the cost, the producers were separated into two groups and business training was organized in Tuzla.

Proposed business training program included 5 modules: Entrepreneurial and managerial skills development (personal entrepreneurial competence), Business growth/business growth strategy management, Marketing, Business plan, Financial management.

Module1. Entrepreneurial and managerial skills development (personal entrepreneurial competence)

Personal competence of entrepreneurs is necessary for successful business operations. This module aims at developing personal entrepreneurial skills and includes the following:

- Business negotiations,
- Time management,
- Human resources management.

Module 2. Business growth/business growth strategy management

After the establishment and initial phase of business venture implementation, it is necessary to plan further business growth. The goal of this module is therefore to develop entrepreneurs' business growth knowledge and skills and includes the following topics:

- Cooperative Business competitiveness development,
- Production management,
- Operating management (six sigma, TQM, 7 rings, etc.),
- Strategic management.

Module 3. Marketing

Marketing is an essential segment of all business operations. Marketing needs to be developed simultaneously with business development. In order to develop marketing, it is necessary to develop an entrepreneur's skills enabling him/her to understand and plan marketing accurately, which is the goal of this module.

This module includes the following topics:

- Marketing planning and management,
- Market and competition research,
- Marketing approach,
- Client relationship management (CRM),
- Business intelligence.

Module 4. Business plan

Mini and micro entrepreneurs and persons who started their businesses do not sufficiently use business planning as a tool for business operations management and accurate monitoring of basic business segments, defined in the business plan. This module aims at developing business planning skills and includes the following topics:

- Current business operations analysis,
- SWOT analysis,
- Business venture planning with the aim of business growth.

Module 5. Financial management

The development of financial management skills development is of key importance for every entrepreneur. This module includes the following topics:

- Cost management,
- Financial management and entrepreneurial accounting,
- Business data analysis.

Program included five-day training per group and resulted in development of individual business plans.

2.1.2. Technical training



Technical training is the most important part of education for the selected producers. It was designed in such a way in order to get the producers acquainted with the concept of solar energy and with the essence of solar collector's production. The goal was to transfer specific knowledge (know-how) on production, assembling and installation of solar collectors to each producer.

Picture 1. Technical training

Technical training was completely focused on solar collector's production, enabling producers to produce solar collectors. The training included the following fields:

- Acquaintance with raw materials needed,
- Identification of suppliers of raw materials,
- Actual use of equipment and tools,
- Solar collector's production process,
- Installation and maintenance of equipment.

The training also included basics of environmental protection and energy efficiency framework. This training was organized for all attendees. Education was conducted by an educator specialized in environmental protection and energy efficiency. The nature of technical training that was based on the type of solar collectors (flat or vacuum), depended upon results of market research.

After completion of technical and business training all SMEs were taken on a study trip. The producers of solar collectors visited some well-established and running production enterprises in Graz, where they were able to learn about the manual production in practice, which helped them with positioning on the local market. Study trip was also organized in order to learn about the best solar collector's production practices.



Picture 2,3 – Study trip for producers of solar collectors

During the visit, the producers saw materials, samples of panels and equipment that „ökoTech G.m.b.H./Graz“ is using for their production of plate solar collectors. The main goal was to share experience and improve the existing production of our producers. The producers have visited „Croatian professional association for solar energy“. During this visit they learned more about solar systems for hot water and system for producing electrical energy. It is especially important to note that the study trip additionally motivated producers, participants at the project, to make a final decision on establishing the first association of producers of solar collectors in BiH.

2.2. Increase in use of solar systems for SME's and households

Product development implemented in the Phase II was based on the findings from the Phase I, especially the part related to the loan usage i.e. the need to expand the offer to some additional renewable energy products, besides solar collectors.

Partner MCF developed a new loan product for this project. The new loan product was tailored to serve the client's needs (based on the survey's findings), for both, SMEs for solar collectors' production and loan users who would buy solar collectors for their business or households.

Characteristics of this loan product were designed in a way to be competitive on the finance market and which would also provide some benefits for both categories of loan users. For producers there was a loan, grant and technical assistance and for end-users it was loan and educational materials etc. In order to encourage potential clients to use this loan product, Partner MCF charged below market interest rate. Below the market interest rate is interest rate below the current commercial lending rate used within Partner MCF as well as in general financial market. The charged interest rate was 3.99 %.

Project results included the installation of over 120 solar systems in Bosnia and Herzegovina in the total value of 525,877.63 USD. On the annual level, as the result of the installation of over 120 solar systems in Bosnia and Herzegovina, the systems produced 240.000 kWh of electrical energy, with the reduction of CO2 emission of 180 tones.

The increase in the number of actual users of solar collectors was achieved by initiating the local production. The first link is represented by producers, who gained necessary knowledge and practical skills for production of solar collectors. It was achieved through careful selection of both SMEs involved in the project but also selection of external subcontractors for business and technical training.

2.2.1. Users of solar systems

During project implementation USAID Solar Energy project installed solar systems in the following areas:

Type of solar system	Municipality	No.
Photovoltaic systems	Banovici, Jajce , Gradacac and Sarajevo	6
Solar system for space sanitary water	Breza, Citluk, Foca/Srbinje, Gradiska, Kiseljak, Knezevo, Mostar, Odzak, Prnjavor, Sarajevo,Visoko, Gradacac, Modrica,Tesanj,Tuzla, Zenica i Zivinice.	34
Solar system for sanitary water and space heating in combination with pellet boilers	Banja Luka, Bihac, Bijeljina, Bosanska Krupa, Brcko, Sarajevo, Gracanica, Hadzici, Ilidza, Kalesija Lukavac, Prijedor, Srebrenik, Tesanj, Tuzla, Zenica and Zivinice	84

Partner MCF is obliged to respect the Law of the Protection of Personal Data. It is not possible to attach a list of users of solar system to the final report. Following are three users' testimonials as examples of their individual experience.

2.2.1.1. Testimonial 1 – Mersudin Ibric from Tinja



Mersudin Ibric from Tinja near Srebrenik is the first one who installed solar collectors at the roof of his family house and they are also the part of the pellet heating system. Sanitary water for the needs of his household is heated by solar energy which is accumulated by solar panels and in that way heating of living areas is significantly supported and the basic energy source is decreased.

Picture 4. Users of solar system: Ibric Mersudin, Tinja, BiH

Mr. Ibric was granted a micro loan at Partner in the amount of USD 5,714.00 with payment period of 60 months and a favorable interest rate of 3.99%, which is in the scope of the Project earmarked to clients for implementation of solar systems in order to reduce usage of traditional fossil fuels. After only a few months of usage effects were better than expected. *“Earlier, I got electricity bills in the amounts of USD 60 and the first one that I got after this system was implemented was approximately USD 35. Consumption of pellet is also reduced since there were many sunny days during this fall and rarely ever the temperature of water was going lower than 50 degrees C.”* said Ibric.

According to his observations, if a day is sunny thermal energy is accumulated on solar collectors regardless of the air temperature. *“There were days when the temperature outside was below 10°C and water in the tank was heated by solar energy and it reached even more than 50°C. All in all, total energy savings are more than 30 percent”* said the pioneer in usage of alternative sources of energy from Srebrenik area. The system is most commonly consisted of 2 or 3 panels, pump assembly and a combined water-heater with two heat-exchangers that, besides solar energy, can also use other heat sources, mainly pellet. The amount of procurement is USD 2,570.00, no VAT and installation expenses included, and in maximum conditions it produces 4.5 kW of energy. The system pays off in the period from 3 to 5 years.

2.2.1.2. Testimonial 2 - Ahmed Sikiric, Fojnica, BiH

Project of Partner MCF has made his old wish come true and realistic. The system that Ahmed decided to install comprises vacuum collectors with 90 vacuum pipes in total, solar sub-stations, 1.000 litres water tank for water used in premises heating system, additional boiler capacity 80 litres for technical sanitary water, stoves for main fuel and other support equipment.



Picture 5. Solar system in Fojnica

The cost of investment was over USD 6,860. Mr Sikirić took in Partner MCF a loan in the amount of USD 5,150, with 4 years repayment period and a monthly instalment of USD 116. He chose the company SOLAR TEHNIC from Srebrenik as the contractor of the works. Their system started functioning in February this year. End of last and beginning of new heating season are not sufficient period to round up the whole picture regarding generated savings,

but consumption of wood, which this man from Fojnica was using to heat the premises, significantly decreased. *„I coated the house earlier with 10 cm thick styropor and installed necessary inside thermal insulation, which in my opinion, resulted with 45% of savings in wood. After installation of solar collectors, I heat less for 30 to 40 %, so it clearly shows what the achievements in energy efficiency are. Even when it is cloudy, the water in the system can reach the temperature between 30 and 40 degrees, and during sunny periods, regardless the outside air temperature, it reaches even 60 degrees“* says Ahmed Sikirić.

Fog and smog are the biggest obstacles to good use of solar systems, and according to Sikirić's words, the position of house is very important, in fact the position of panels accumulating sunlight. When only client and his wife are in the house, 80 square meters of premises are heated, and when their sons working abroad are there, the heated area is three times bigger. He does not use the usual 15 to 16 meters of wood per season, and electricity bills are much lower. *„In addition, long-term and minimum maintenance costs are big benefits of solar systems, because interventions and repairs are needed only in case of mechanical damages“*, says Mr Sikirić.

2.2.1.3. Testimonial 3 - Enes Dizdarevic, Zenica, BiH

What are the benefits of installation and use of solar systems, Mr Dizdarević demonstrated with his own example, because he installed to his house a system with 4 solar collectors, and boiler capacity 500 liters, and he uses the solar energy this way as a support to the heating of residential premises size 160 square meters, reducing the consumption of pellet as the main fuel.



Picture 6. User of solar system

„Electricity savings are up to 90%, because I do not turn on boiler anymore to heat the water. Thanks to solar light, I spent this year twice less of pellet than usual“ says this businessman from Zenica, emphasising that his system has already paid itself off, which is much shorter than projected return period of 3.5 years.

Possibility for citizens, businessmen and public institutions to resolve this way the water heating and partially the heating in premises, through the project is open with availability of favourable loans in Partner microcredit foundation. „*Poor purchase power of citizens is currently the main reason why we do not have more solar collectors at our roofs. This dedicated loan is excellent opportunity, because the savings are significant and they cover the amount of monthly instalment*“ – says Mr. Dizdarević.

III. CAPACITY BUILDING AND RAISING AWARENESS ACTIVITIES

1. INTRODUCTION

The project included numerous activities related to marketing campaign in order to raise public awareness about the benefits of usage of solar collectors. Raising awareness was designated in such a way to reach the target population, mainly private households and micro companies that use a lot of water (hairdressers, small motels, car wash, restaurants etc.). The activities had two messages: ecological – protecting nature and economic by practical calculations on exact savings per household and business.

2. CAPACITY BUILDING

2.1. Technical education for 20 SMS's



Technical and business training process of the selected entrepreneur's representatives was one of the most important steps necessary for the implementation of the entire project. Also proper selection of the entrepreneurs, willing to participate in the project and preparation of loans and grants disbursement, were very important and challenging processes crucial for the successful implementation of the project. In 2012, 20 companies participated in a technical training on production of solar collectors and installation of solar systems.

Picture 7. Technical education

During the training, participating companies produced 40 hot water solar collectors, which were installed at Tuzla's City Stadium. These systems heat 4,000 liters of water a day to a temperature of 55 ° C, which is enough to meet the daily needs for 300 users at Tuzla's Stadium.

2.2. Technical education for photovoltaic systems

USAID Solar Energy project organized technical education for producers of solar collectors and Partners' staff on technical characteristics of photovoltaic systems for electric energy production. In July 2014 the project expanded financing to photovoltaic systems. It was necessary for the producers to learn, in practical terms the way of functioning and characteristics of photovoltaic systems, enabling them for installation and servicing systems.



Picture 8, 9 Technical educations

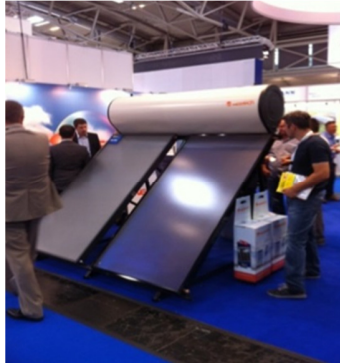
In order to sell the new product it was necessary to get acquainted the loan officers with technical characteristics and benefits from the photovoltaic systems. The tailored training was aimed to get internal buy-in from staff, and to share practical advices built around technical characteristics of solar panels (photovoltaic systems).

2.3. Fair Visit for producers of solar collectors

2.3.1. Ljubljana, Slovenia

USAID Solar Energy project organized a study trip (Fair Visit) for producers of solar collectors. The visit was organized in period of March 9th until March 11th 2015. The producers visited the Fair "Home" in Ljubljana, Slovenia. The aim of this visit was to give an opportunity to producers to learn about the new technologies and to make contact with suppliers for solar materials and equipment.

2.3.2. Munich, Germany



Picture 10. Intersolar Fair

USAID Solar Energy project organized a study trip (Fair Visit) for producers of solar collectors. The visit was organized in period of 9th June until 12th June 2015. The producers visited the Intersolar Fair in Munich. The aim of this visit was to give an opportunity to producers to learn about the new technologies and to make contact with suppliers for solar materials and equipment.

2.4. Staff education as technical assistant for solar space heating

Beside the mention photovoltaic systems the offer was extended to combination of pellet boilers and solar collectors. In order to present the new solar system additional training for Partner's Loan Officers was organized by USAID Solar Energy project.

Since the Loan Officers were in charge of loan disbursement, it was essential for them to learn concrete benefits and savings for clients from usage of the combined heating systems (pellet boiler and solar panels).



Picture 11, Practical training

The practical training enabled them to promote the benefits of solar energy to potential clients more efficiently. The tailored training was aimed to get internal buy-in from staff, and to share practical advices built around technical characteristics of solar system. The training was organized in Bijeljina, Laktasi, Vitez and Gorazde (over 100 loan officers participated in this event)

3. RAISING AWARENESS IN SOLAR ENERGY

3.1. Promotional material

USAID Solar Energy project, in cooperation with the producers of solar collectors considered a possibility of introducing a special system for solar space heating as support to the heating system (pellet boilers). This is environmental friendly and domestic product, the same as solar collectors, was also offered under special conditions regarding the price and benefits to users of solar systems. Also, this was recognized as a great opportunity to increase the level of domestic production, and thereby support innovative usage of solar energy and additional effort in raising awareness of all benefits of advantages in using renewable energy sources (pellet boilers).



Picture 12. Solar system in combination with pellet boilers

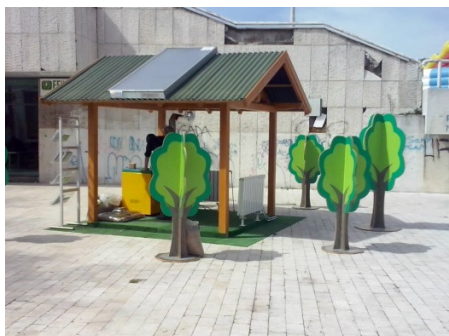


Picture 13. Small solar system

In order to improve sales of solar collectors, producers of solar collectors cooperated with domestic producers of pellet boilers. The aim of the cooperation is to establish a favorable price on the solar heating system in combination with pellet boilers (under-market price of systems from 20kW to 25kW acceptable to the market). In order to describe characteristics and benefits for the end-users two informational flyers were prepared.

One flyer was designed for solar system in combination with pellet boiler and the other one for small solar system for sanitary water.

3.2. On-side presentation of solar systems



Picture 14. The model house with solar – pellet system

The model house, during its three-year tour, visited many fairs, shopping malls and markets in Banja Luka (international fair), Tuzla (Pannonia Lakes, Konzum) Sarajevo (BBI Center), Mostar (International Fair), Zenica international fair), Brcko (local fair), Gradacac (local fair), and Bihac (local fair).



Picture 15. Local fair in Gradacac

In addition to the model house the project staff and producers were disseminating promotional materials and information necessary to understand the benefits of using renewable energy sources.

3.3. Door to door promotional activity throughout BiH

Door to door promotional activity was conducted through market research for potential users of solar collectors in Neum, Capljina, Velika Kladusa, Zenica and Banja Luka. This activity was conducted in the period from June to November 2015. Raising awareness was designated in such a way to reach the target population, mainly private households and micro business that use a lot of hot water as small motels, apartments, restaurants and rent houses. This research was organized in cooperation with producers of solar collectors. The visitors were also able to see the exposed example of solar system for space heating with pellet boilers. Partner MCF has also organized “door to door” promotion which included 10 Loan Officers. As the result, Partner MCF Loan Department representatives visited more than 700 potential users of solar collectors.

The aim of the activity was to establish an immediate contact with prospect clients and to create an opportunity to introduce benefits of usage of renewable energy sources.

Also, Partner MCF sent SMS messages to active clients with the following content *"NEW-possibility of installing solar collectors in cooperation with Partner Microcredit Foundation. With technical support from our associates, install a solar system for heating and hot water; achieve a saving of a minimum of 30% of your current consumption. Call us on 080 020 207. Let the sun into your home."* SMS messages were sent to 8,832 active clients (clients who have a loan in Partner MCF).

3.4. Multimedia exhibition for solar systems in Sarajevo and Tuzla

Besides the mentioned promotional activities at the targeted specialized fairs additional efforts to raise awareness of the general public were taken. It was achieved through a multimedia exhibition organized in Sarajevo and Tuzla. The events were organized as an open door promotional activity where visitors were able to see lighting, refrigerator and TV running on electricity produced by photovoltaic panels. Also there was a practical presentation of sanitary water heating by solar collectors.



Picture 16. Multimedia exhibition in Tuzla



Picture 17. Multimedia exhibition in Sarajevo

3.5. Project's web site: www.solarnikolektori.ba

USAID Solar Energy Project designed a projects' web site in order to promote solar energy and project results. Also the web site designed as interesting and simple for potential users. For example, the web site has calculator for savings and calculator for loan.

Also, web site has all information about project activities, success stories about users of solar collectors who installed solar systems, stories about production of solar collectors.



Picture 18. Web site www.solarnikolektori.ba

IV. THE SUMMARY OF FACED DIFFICULTIES

- The change in the project structure, at the beginning of the project (the split of the project in two phases), shifted the Phase II to change a seasonality, which caused serious delays in the projects schedule and affected the predicted results. That was the reason that the Phase II started with the selection of stakeholders in summer, instead of the winter. The first issue that occurred with the dynamics of the planned loan disbursement for users of solar systems was that we were not able to disburse loans since the manufacturers were not ready to start with the production of solar collectors. Because of the changes in the project structure all project activities were delayed for almost one year. Considering the nature of the product, it was difficulty to install a solar system under harsh weather conditions. The activities aimed at enabling producers to start with the production were completed only by the end of the year.

- Partner MCF provide financial services only to economically active population with either difficult or no access to commercial funding to start up or develop business as well as improve quality of life. This means that Partner MCF had eliminatory criteria and provide loans to client whose household members do not have income higher than 233 USD per member (four household member family should not have income higher than 933 USD). By this regulation Partner was not able to provide loans to population with regular monthly income, owners of the bigger companies (motel, hotel, restaurant) i.e. population who has access to commercial banks. After two months of extensive communication and in order to achieve results specifically on loan disbursement of this project Partner MCF was able to change criteria only for this loan product.

V. LESSONS LEARNED

- The initial market research, the Phase I, was essential to determine the real demand on the market but also determining the price which would be acceptable for prospect clients. Since Partner MCF has switched its focus on different population, than Partner initial target population, and taking into consideration that this new group of potential clients has access to commercial banks, Partner improved loan conditions for loans for solar collectors.
- The initially offered interest rate of 9.99% was decreased to more acceptable rate of 3.99%. Based on the experience gained through loan disbursement, Partner MCF has noticed that there was a demand at the market for additional funds after approval of commodity loans for solar collectors. Specifically, usually after the installation of solar system clients needed some changes or upgrades that required the purchase of materials for the solar system, such as: copper pipes, valves, bigger boiler, new roof construction, radiators for heating and etc. Based on that, Partner MCF proposed that the existing commodity loan could be disbursed in the combination of commodity and cash in the way that 70% of the loan amount be disbursed as a commodity part of the loan, while 30% of the loan amount represents cash payments directly to the client for the purchase of additional materials.

- Given that the savings achieved as a result of using solar collectors are gained during the summer, Partner MCF also proposed a new conditions for the loan: to approve a grace period in order to facilitate the payment of installments during the winter time. Partner MCF proposed possibility to use grace period of maximum 6 months that could be used in winter time.
- USAID adaptable and open cooperation resulted in accepting changes in project scope by introduction of new items (photovoltaic panel) and new renewable heating systems (pellet-boiler). Before that the loan product was exclusively for supply of plate solar collectors. During the planning period it is very difficult to estimate the demand at the market and the needs of the prospect buyers. Therefore it is essential to have adaptable partner, who is open to changes in project's scope.
- In order to improve the offer, Partner MCF, in cooperation with companies producing other renewable energy products for space heating (i.e. pellets, biomasses etc.), introduced a special system for solar space heating assupport to the other renewable energy products heating system. This was environmental friendly and domestic product, as solar collectors, other renewable energy products. Also, this was a great opportunity to raise the level of domestic production, and thereby support innovative usage of solar energy and additional effort in raising awareness of all benefits of advantages in using renewable energy sources. It should be noted that the solar collectors without adequate support heating system, could not warm up the space in the winter. For this reason, most potential clients were not interested in use of solar system, which consists only solar collectors. With this special solar system which replaced existing heating system (such as heating, coal, central heating, electn.city and other smaller ecological systems), potential clients gained significant cost savings.
- Within the project, production of solar collectors in BIH was successfully launched and the number of manufacturers of solar collectors has been increased to 20. Through financial support that is provided to 20 manufacturers of solar collectors (loan + grant), finalized in March 2013 as a part of the project, capacity of local manufacturers has significantly increased, which was a precognition of a successful project implementation.

- In order to animate smaller households and businesses in need for hot water with a regular consumption of 150-200 liters, Partner MCF have proposed creation of a small solar system which consists of a single plate solar collector and solar water heater to 150 liters. The value of “small solar system” is up to 1,266 USD. This solar system is suitable for houses, residential buildings, garages, workshops, agricultural sites and the like. Partner MCF had introduced this system to public, intensively promoting defined elements, including savings, a unique amount as well as setup costs (e.g 1,266 USD/30 - for only 48 USD per month get saving with solar energy). Partner MCF could increase the possibility for realization of loan disbursement, primarily because of its convenience and reasonable prices. It is important to note that this solar system, because of cost and construction, are acceptable for Partner s target population.
- During the project period a successful cooperation with the project participants - producers of solar collectors was established. Within the project’s scope, the producers have provided technical support to potential clients. However, engaging experts in the area of renewable energy in similar project would fully facilitate monitoring activities after the site visit or provide better quality of technical support to potential beneficiaries.
- For projects that are related to weather conditions, as it was the case with this project - since the installation of solar collectors is performed exclusively during sunny days, it is necessary to take into consideration the seasonal changes, during planning period and setting timeframes. In our case, out of the 12 months in a year, it is possible to install the systems only during the period of 4-6 months in a year.
- Establishing production of a domestic product in the project was facilitated by technical training for producers and allocation of financial resources to start-up production. However, the planned activities, in our case, have not provided funds and needed time for certification process of the locally produced solar collector, which would’ve had important impact on access to sales channels.
- Project implementation period was 36 months, out of which 30 months was related to Phase II, which mainly consisted of finding the market and disbursing loans for the installation of a minimum of 200 solar systems. Originally, the estimated time to achieve

the goals did not include the fact that the installation of solar systems is done seasonally, during appropriate weather conditions.

- The Loan Officers, which are always essential for marketing the product, as the last, however the most important link in the chain, must be very knowledgeable and convincing in order to sell product. Partner MCF had a similar project in energy efficiency which started at about same time as the solar project, so it was easier to upgrade the existing knowledge of the loan staff. The gained experience showed that two or more similar project can be in offer, creating synergy effects, considering the same target population.
- The solar energy project was exclusively linked to the improvement and protection of the environment but did not envisage employment of an expert in this field.

RECCOMENDATION

According to the relevant experience in other project, it would be recommendable to plan a certain funds for supply of specific software which would automatically calculate the savings in primary energy and reduction in CO2 emission. Partner MCF uses software on the other project, and the use of the stated or similar software is highly recommendable, since it materializes savings on monthly, annual and the equipment life-time basis. The calculations proved to be a very good and usefully tool for marketing a renewable energy product.

ANEX A: LIST OF PRODUCERS OF SOLAR COLLECTORS

1. Temos d.o.o. Sarajevo www.temos.ba
2. Res Domino d.o.o. Kalesija www.resdomino.ba
3. HDI d.o.o. Sarajevo www.hdi-solar.com
4. Kovan ZR Gračanica www.kovan.ba
5. Zi-Mi d.o.o. Tuzla www.zimi-solarnaenergija.com
6. Finesa d.o.o Kalesija, PJ Tuzla www.finesa.ba
7. Solar Mont d.o.o. Gradiška www.solarnikolektori.org
8. BH-Servis i.r. Maglaj www.bh-servis.ba
9. Termoelektro NS d.o.o. Gradiška www.termoelektro-ns.ba
10. Seos d.o.o. Pazarić www.seos-solar.com
11. Elektrotehnika-Frigo-Servis Cooling s.z.r. Zenica www.cooling.ba
12. LED d.o.o. Mostar www.ledmostar-solar.ba
13. Energomont o.z.t.r. Modriča www.energomont.ba
14. Fakom d.o.o. Banja Luka www.fakom.net
15. Mikom d.o.o. Tuzla www.mikom.ba
16. Limarija Likić s.z.r. Breza www.limarijalikic.ba
17. LAFAT KOMERC d.o.o. www.lafat-komerc.com
18. Solar Tehnic d.o.o. Srebrenik www.solartehnic.com
19. Elektrottest doo Vogošća www.elektro-test.ba
20. Mino doo Ilijaš www.mino-bh.com

ANEX B: LIST OF SUCCESS STORIES

1. User of solar collectors, Mersudin Ibric, Tinja
2. User of solar collectors, Nermin Samjic, Tuzla
3. User of solar collectors, Villa Anry, Mostar
4. User of solar collectors, Milan Kojic, Bijeljina
5. User of solar collectors, Enes Dizadrevic, Zenica
6. User of solar collectors, Anes Dedic, Tuzla
7. User of solar collectors, Asmir Kevric, Gradacac
8. User of solar collectors, Samir Hamzic, Sarajevo
9. User of solar collectors, Senada Dedic, Tuzla
10. User of solar collectors, Esad Muharemovic, Jelah
11. User of solar collectors, Alendar Mustafa, Mostar
12. User of solar collectors, Dobrnjac Marko, Gradiska
13. User of solar collectors, Umihanic Suad, Zivinice
14. Domestic production of solar collectors, Frigoservis Zenica
15. Domestic production of solar collectors, ZIMI Ltd Tuzla
16. Domestic production of solar collectors, Finesa Ltd Kalesija
17. Domestic production of solar collectors, Res Domino Kalesija
18. Domestic production of solar collectors, Solar Mont Ltd Gradiska
19. Domestic production of solar collectors, Fakom Ltd Banja Luka
20. Domestic production of solar collectors, Lafat Komerc Ltd Kalesija
21. Domestic production of solar collectors, Temos Ltd Sarajevo
22. Domestic production of solar collectors, Mikom Ltd Sarajevo

ANEX C: PERFORMANCE BASED MONITORING PLAN (PBMP)

Indicator 1	Target	Achieved
% of disbursed loan portfolio for solar collectors	100%	106,48%*
Number of manufacturers of solar collectors (sustainable solar production)	20	20

Indicator 2	Target	Achieved
Number of participants in technical education	3	6
Fair visits for manufacturers of solar collectors	3	3
Number of operational web-sites (manufacturers)	20	20
Number of participation at the Economic Fairs in BiH (during promotional activities)	20	20

* disbursement of USAID loan portfolio and Partner MCF cost share

Indicator 3	Target	Achieved
Number of user who will take a loan in Partner MCF for solar collectors	108 users	124 users
Amount of disbursed loans for solar collectors	493,854.37 USD	525,877.64 USD*

* disbursement of USAID loan portfolio and Partner MCF cost share

Indicator 4	Target	Achieved
Number of distributed promotional leaflets	50,000	50,000
Number of participation at the International Fairs in BiH	22	22
Number of distributed educational brochures	1,000	2,000